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Original/*Otros*

Association of *Helicobacter pylori* infection with nutritional status and food intake[1]

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Abstract

Introduction: **the *H. pylori* infection affects more than half of humanity, being a public health problem. Its prevalence is significantly higher in developing countries like Brazil. It has been suggested that *H. pylori* infection may influence the intake and caloric homeostasis.**

Purpose: **to compare nutritional status and food intake of patients attended by National Health System, with and without *H. pylori* infection.**

Methods: **140 patients were assessed. They performed upper gastrointestinal endoscopy to investigate the presence of *H. pylori*. Body weight and height of the patients were measured. Food intake was investigated through two 24-hour recalls, with data transformed in grams and analyzed in DietWin Professional 2.0 software. The findings were compared using the chi-square test or Student's t-test, adopting $p < 0.05$ as significance level.**

Results: **there was predominance of patients with excess weight for both Hp - (60.3%) and Hp + (67.7%), with no difference between them. Food intake of assessed groups was similar.**

Conclusion: **no differences were found in nutritional status and food intake between the two studied groups.**

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Key words: *Helicobacter pylori*. *Obesity. Body weight*. *Nutritional status*. *Diet*.

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ASOCIACIÓN DE LA INFECCIÓN POR *HELICOBACTER PYLORI* CON EL ESTADO NUTRICIONAL Y LA INGESTA DE ALIMENTOS

Resumen

Introducción: **la infección por *H. pylori* afecta a más de la mitad de la humanidad, siendo un problema de salud pública. Su prevalencia es significativamente mayor en los países en desarrollo, como Brasil. Se ha sugerido que la infección por *H. pylori* puede influir en la ingesta y la homeostasis calórica.**

Propósito: **comparar el estado nutricional y la ingesta de alimentos de los pacientes incluidos en el Sistema Nacional de Salud, con y sin infección por *H. pylori*.**

Métodos: **se evaluarón 140 pacientes. Realizaron la endoscopia digestiva alta para investigar la presencia de *H. pylori*. Se midieron el peso corporal y la altura de los pacientes. La ingesta de alimentos se investigó a través de dos recordatorios de 24 horas, con los dados transformados en gramos y analizados en el software DietWin Professional 2.0. Los resultados se compararon mediante la prueba de chi-cuadrado o la prueba t de Student. Se adoptó de $p<0,05$ como nivel de significación.**

Resultados: **hubo predominio de pacientes con exceso de peso tanto para Hp - (60,3%) como Hp + (67,7%), sin diferencias entre ellos. La ingesta de alimentos de los grupos evaluados fue similar.**

Conclusiones: **no hubo diferencias en el estado nutricional y la ingesta de alimentos entre los dos grupos.**

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Palabras clave: *Helicobacter pylori*. *Obesidad*. *Peso corporal*. *Estado nutricional*. *Dieta*.

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Abbreviations

WHO: World Health Organization.
H. pylori, Hp: Helicobacter pylori.
SUS: Unified Health System.
CNPq: National Council for Scientific and Technological Development.
BMI: Body Mass Index.
POF: Consumer Expenditure Survey.
PNAD: National Household Sample Survey.
IBGE: Brazilian Institute of Geography and Statistics.
NHANES III: Third National Health and Nutrition Examination Survey.

Introduction

Obesity is a public health problem worldwide, being result of a sum of factors related to lifestyle, including an overall increase in caloric food intake and decreased physical activity[1].

Looking for more determinant causes of obesity, in recent years it started to glimpse in literature a possible association between obesity and the presence of *H. pylori* infection[2-6].

The *H. pylori* infection affects more than half of humanity. Its prevalence is significantly higher in developing countries and in all ages, affecting 70% to 90% of the population. In developed countries the prevalence is lower, ranging between 25% and 50%. In Brazil the prevalence in adults is 82%[7].

Researches point out that infection with *H. pylori* can influence the intake and caloric homeostasis by ghrelin signaling[8], a peptide secreted in the stomach and involved on food intake behavior and body weight regulation. However, the type of influence that occurs is still controversial.

It is known that there is a physiological increasing on ghrelin levels during fasting, increasing appetite and signaling to food intake. As from the beginning of eating act, their levels are going reducing to the same extent in which the appetite also decreases and, thus, the feeding ends[19].

It was observed that in obese subjects the ghrelin levels are not reduced in response to food intake, which may partly explain both the emergence, as the maintenance of your weight excess[10,11].

According to some authors, the gastritis often induced by infection arising from the *H. pylori* infection leads to reduction of gastric ghrelin levels, with repercussions in serum levels. If this reduction in fact occurs, may be associated to weight loss[12].

Coherently, the bacterial eradication appears to influence the ghrelin dynamics, restoring their levels and increasing body weight[4,13-14].

However the relationship is not so clear, so there are studies that confirm these observations cited[13], but there are studies linking weight gain with the microorganism presence[8]. There are also studies that did not detect changes in ghrelin levels associated to infection[12].

The addiction of a mediator potential in the process of weight gain, *H. pylori* generates expectations as to whether or not of influence of infection by this organism on body weight and eating behavior. The aim of this study, therefore, was to compare the nutritional status and food intake of patients with and without *H. pylori* assisted by the Unified Health System (SUS).

Purpose

The aim of this study was to compare the nutritional status and food intake of patients with and without *H. pylori* assisted by the Unified Health System (SUS).

Methods

This is an analytical study with a quantitative approach. It was developed in a health care facility that attends patients of Unified Health System (SUS). The Health Unit was chosen based on the existence of a Gastrointestinal Endoscopy Service. The study population consisted of patients who sought the Endoscopy Unit of the cited institution to perform the upper gastrointestinal endoscopy.

This study is a subproject of the research "*H. pylori*, ghrelin, appetite and body weight: effects of the presence and eradication of the microorganism in patients of the Unified Health System", funded by the National Council for Scientific and Technological Development (CNPq), through CNPq's Universal Notice 14/2011, process 483302/2011-2.

The sample was calculated considering systematic review and meta-analysis of Nweneka and Prentice[15], who assessed studies focusing on the theme to be addressed here. To the calculation, among the studies encompassed by these authors, were considered those who had at least 50 individuals in each of the two groups (H. *pylori* positive or negative), with an alpha error of 0.05 and power = 0.80. Thus, the planned sample, depending on the assessed study, ranged from 38 to 72 subjects in each group.

Patients with gastric cancer, by the possible influence on the markers to be evaluated, people who did not live in the capital, people having gastrointestinal bleeding, people who were receiving drug treatment using proton pump inhibitor, besides elderly and children were excluded.

The final sample was constituted by 140 people who were treated at the location already cited, 62 were *H. pylori* positive and 78 were *H. pylori* negative.

Data collection occurred from July 2012 to May 2013 and encompassed exams and interview to obtain information as follows discriminated: identification of participants; gastrointestinal endoscopy with biopsy; anthropometry (weight and height measurements); 24-

hour food recall, before the endoscopic exam and referring to one day of consumption at home, obtained by telephone or home visit, in which one of the two occasions reported the consumption in one day of weekend.

The patients showed up, after six hours fasting completely and eight hours fasting for dairy products, to perform upper gastrointestinal endoscopy. Endoscopic biopsies are already part of routine service, independent of other clinical indications, for investigation of the presence of *H. pylori*.

For such investigation, three fragments of the gastric antrum were collected with endoscopic forceps that later, with the aid of disposable needle, were directly transferred to the test tube containing the URETEST® urea solution, and kept at room temperature. The verification of results was performed after 24 hours. Patients were considered *H. pylori* positive if the urease test accused presence of microorganism, which, in accord to manufacturer, is demonstrated by the change of the solution color from yellow to red. The participants were divided into two groups: *H. pylori* positive (Hp +) and *H. pylori* negative (Hp -).

The body mass index - BMI (kg/m^2) of patients was determined before the endoscopic exam by collecting data on weight and height. To this, we adopted protocol of Alvarez and Pavan[16], using anthropometric scale, brand: Balmak, capacity 200 kg with an interval of 100 g and 2.00 m with an interval of 1.0 cm. From the BMI nutritional status of the participants, they were classified according to WHO[17], with obesity grades 1, 2 and 3 grouped as obesity.

The realization of two 24-hour food recalls, involving one day of the weekend, was followed by the literature recommendations as to the minimum number of dietary recalls and as to the need to investigate days of unusual consumption[18].

The data, provided in portion sizes were converted into grams by standardization of *Table of reference measures for food consumed in Brazil*, recently developed by the Consumer Expenditure Survey - POF 2008-2009[19].

After this procedure, the data were input in DietWin Professional 2.0 software for analysis of calories, cholesterol, sodium and macronutrients: proteins, fats (total fat, monounsaturated and polyunsaturated) and carbohydrates (including determination of fibers).

The data were tabulated and were presented in simple and percentage frequencies, means and standard deviations or medians and interquartile ranges, always comparing the findings of the two groups of patients (Hp + and Hp -).

The data were analyzed using statistical programs Epi Info™ 7.1.0.6 and SPSS (Statistical Program for the Social Sciences), version 20.0. The categorical variables were analyzed using Chi-square test. Kolmogorov-Smirnov normality test was performed. From this, we used the Student's t-test to compare means or Mann-Whitney test to compare the means of ranks. For all tests we used $p < 0.05$ as significance level.

The project was designed according to Resolution 196/1996 of the Ministry of Health[20], which regulates the development of human research. The same was approved by the Ethics Committee for Research on Human Beings of the institution responsible for the study, number 11582611-4 and the data collection was initiated only after approval by the committee. Participants, according to that resolution, signed a free and informed consent form, nodding their participation in the study.

Results

Among the 140 patients, 101 (72.1%) were women and 39 (27.9%) were men. Regarding the presence of *H. pylori*, 78 (55.7%) were Hp - and 62 (44.3%) were Hp +, with 18 men and 44 women Hp +, without difference considering sex ($p = 0.782$). The mean age of participants was 39.7 ± 12.0 years, being similar in both groups: 39.9 ± 12.1 years among patients Hp + and 39.6 ± 11.9 years among Hp - ($p = 0.232$).

Table I shows the findings concerning the characterization of the evaluated group. Regarding educational level, most interviewees had between 9 and 11 years of study, which is to attend high school, with no statistical difference ($p = 0.196$) between the two groups.

The distribution of patients by household income was determined by the amount of minimum wages received by the family, considering the minimum wage at the time of data collection, R$ 678.00. The mean household income was 2.4 ± 1.9 minimum wages, the same to men and women. There was no difference between the two groups of patients ($p = 0.836$).

It also regarding race (self-reported), the data were similar ($p = 0.665$). To the race classified as ''others'' were included black, mixed race and yellow.

The nutritional situation of the group was investigated considering the body mass index (BMI).

The nutritional status of the patients, determined by BMI and categorized by WHO[19], revealed a prevalence of patients with nutritional diagnosis of overweight in both Hp - (29 - 37.2%) and Hp + (22 - 35.5%), as shown in table II. Considering patients with excess weight (overweight and obesity) and normal weight (underweight and normal weight), there was found no significant difference between patients Hp - and Hp + ($p = 0.361$) as shown in table III.

Regarding no more the nutritional categorization, but the mean BMI, men Hp - and Hp +, respectively, had an average of 26.6 (±5.2) kg/m^2 and 26.2 (±3.9) kg/m^2 ($p = 0.802$); in relation to women, averages were 28.3 (±6.4) kg/m^2 and 26.8 (±5.1) kg/m^2 ($p = 0.191$). Therefore, the average of all patients Hp - was 27.8 (±6.1) kg/m^2 and Hp + was 26.6 (±4.8) kg/m^2, $p = 0.208$.

The patients Hp - had apparently a higher consumption of calories and of all the items analyzed, with exception of cholesterol, however without statistical significance, as can be seen in table IV.

Table I
Distribution of patients according to years of study, household income and race by presence of H. pylori and sex. Fortaleza city, 2013

	Negative			*Positive*			*Total*	*Test*[1]
	Male n (%)	*Female* n (%)	*Total* n (%)	*Male* n (%)	*Female* n (%)	*Total* n (%)	n (%)	
Years of study								
≤ 8	9 (42.8)	14 (24.6)	23 (29.5)	6 (33.3)	21 (47.7)	27 (43.5)	50 (35.7)	$\chi^2 = 3.26$ p = 0.196
9-11	11 (52.4)	32 (56.1)	43 (55.1)	9 (50.0)	20 (45.5)	29 (46.8)	72 (51.4)	
≥12	1 (4.8)	11 (19.3)	12 (15.4)	3 (16.7)	3 (6.8)	6 (9.7)	18 (12.9)	
Household Income (MW)[3]								
<1	0 (0)	2 (3.5)	2 (2.6)	0 (0)	2 (4.5)	2 (3.2)	4 (2.9)	$\chi^2 = 1.45$ p = 0.836
1-3	13 (61.9)	41 (71.9)	48 (61.5)	10 (55.6)	27 (61.3)	43 (69.4)	91 (65.0)	
3-5	7 (33.3)	5 (8.8)	22 (28.2)	4 (22.2)	13 (29.5)	13 (21.0)	35 (25.0)	
≥ 5	1 (4.8)	7 (12.3)	4 (5.1)	3 (13.6)	1 (2.3)	2 (3.2)	6 (4.2)	
DNK[2]	0 (0)	2 (3.5)	2 (2.6)	1 (5.6)	1 (2.3)	2 (3.2)	4 (2.9)	
Race (self-reported)								
White	3 (14.3)	10 (17.5)	13 (16.7)	2 (11.1)	5 (11.4)	7 (11.3)	20 (14.3)	$\chi^2 = 0.82$ p = 0.665
Brunette	10 (47.6)	22 (38.6)	32 (41.0)	9 (50.0)	18 (40.9)	27 (43.6)	59 (42.1)	
Others	8 (38.1)	25 (43.9)	33 (42.3)	7 (38.9)	21 (47.7)	28 (45.1)	61 (43.6)	
Total	21 (100.0)	57 (100.0)	78 (100.0)	18 (100.0)	44 (100.0)	62 (100.0)	140 (100.0)	

[1]p < 0.05 as level of significance; [2]DNK = Do not know; [3]MW = Minimum Wage (R$ 678.00)

Table II
Distribution of patients according to nutritional status, sex and presence of H. pylori. Fortaleza city, 2013

	Male		*Female*		*Total*	
Nutritional status[1]	*Negative* n (%)	*Positive* n (%)	*Negative* n (%)	*Positive* n (%)	*Negative* n (%)	*Positive* n (%)
Underweight						
Normal weight	11 (52.4)	5 (27.8)	18 (31.6)	14 (31.8)	29 (37.2)	19 (30.6)
Overweight	6 (28.6)	8 (44.4)	23 (40.3)	14 (31.8)	29 (37.2)	22 (35.5)
Obesity	4 (19.0)	4 (22.2)	14 (24.6)	16 (36.4)	18 (23.1)	20 (32.3)
Total	21 (100.0)	18 (100.0)	57 (100.0)	44 (100.0)	78 (100.0)	62 (100.0)

[1]Nutritional status determined by Body Mass Index and categorized according to World Health Organization (1998), with the different degrees of obesity (I, II and III) grouped in one only category.

Discussion

Initially addressing the urease tests results, noted that in 140 people, 44.3% were positive for the bacteria. This is not a prevalence study, but was expected finding values closer to other studies in the region, once the patients entered the study randomly. The findings are also below the percentage found in developing countries, but coincide with those of developed countries[5].

Ford and Axon[21] summarized the literature published between April 2009 and March 2010 concerning the epidemiology of *H. pylori*. This search identified 17 studies that reported the prevalence of *H. pylori* infection in various groups of healthy individuals. The prevalence ranged from 7% in a study conducted among asymptomatic children in the Czech Republic, to 87% in a South African population of the Eastern Cape. Prevalence in European studies ranged between 7 and 33%, between 48 and 78% in South America studies and between 37.5 and 66% in Asian studies.

Regarding the Brazilian epidemiological data, also in Fortaleza city, the prevalence of *H. pylori* infection

was assessed in 610 residents of an urban low income community. It was found that 62.9% (384) had *H. pylori*[22]. Data from this study were collected in 2000 and 2001, and may have changed the situation found at that time. Moreover, the fact of being conducted in low-income population can justify the much higher number than that found in the present study because the group investigated over there had the average monthly income of 0.5 minimum wages and the present study 2.4 minimum wages. Nogara, Frandoloso and Rezende[23] investigated the *H. pylori* seroprevalence in 48 patients from a gastroenterology ambulatory, in Blumenau city (Santa Catarina state), finding only 33.3% with bacteria and with a predominance of people who received more than 4 minimum wages.

A methodological aspect of this study that deserves discussion is the use of urease test for the diagnosis in the presence of infection, which is sometimes criticized and, in literature is always discussed about what is the best detection test. The 3rd Brazilian Consensus about *H. pylori*[24], puts as gold standard method the urea breath test with ^{13}C, with sensitivity and specificity above 95%, but with use in the country limited to major urban centers and epidemiological studies, because it is not so cheap here as abroad. However, the document approves the use of other methods, the urease test among them, although highlighting the importance of the quality of the material and the competence of the responsible for obtaining this.

In a review of Tonkic *et al.*[25], the accuracy above 90% for the urease test was appointed, but noting that this test can be compromised by the presence of gastrointestinal bleeding. In the present study, patients with this condition were excluded.

Seo *et al.*[26] investigated the positivity of *H. pylori* by applying the urease test and histopathologic exam in 811 children and 224 adults. These authors pointed out that using of acid secretion inhibitors decreases the *H. pylori* density, contributing to the appearance of false negatives. In this study were not included users of these drugs.

Table III
Distribution of patients according to excess weight, sex and presence of H. pylori. Fortaleza city, 2013

Excess weight[1]	*Male*			*Female*			*Total*		
	Negative n (%)	*Positive n (%)*	*Test*[2]	*Negative n (%)*	*Positive n (%)*	*Test*[2]	*Negative n (%)*	*Positive n (%)*	*Test*[2]
No	11 (52.4)	6 (33.3)	χ^2 =1.430 p=0.232	20 (35.1)	14 (31.8)	χ^2=0.119 p=0.730	31 (39.7)	20 (32.3)	χ^2=0.836 p=0.361
Yes	10 (47.6)	12 (66.7)		37 (64.9)	30 (68.2)		47 (60.3)	42 (67.7)	
Total	21 (100.0)	18 (100.0)		57 (100.0)	44 (100.0)		78 (100.0)	62 (100.0)	

[1]Excess weight according to Body Mass Index and categorized by the World Health Organization (1998), with overweight and obesity (I, II and III) grouped in one only category; [2]$p < 0.05$ as significance level.

Table IV
Distribution of patients according to food intake and presence of H. pylori. Fortaleza city, 2013

Food intake	*Helicobacter pylori*				*p value*[1,2]
	Negative		*Positive*		
	Mean/Median	*SD*[3]*/IQR*[4]	*Mean/Median*	*SD*[3]*/IQR*[4]	
Calories[1]	1683	646.5	1630	581.7	0.610
Fiber (g)[1]	13.9	6.2	12.8	7.8	0.352
Carbohydrate (g)[1]	223.5	101.2	207.7	82.9	0.323
Protein (g)[2]	73.8	60.6-88.9	69.5	53.9-89.6	0.307
TF (g)[2]	47.4	38.6-62.8	49.5	33.8-71.8	0.855
SF (g)[2]	13.8	10.3-19.7	13.2	9.3-20.8	0.948
PSF (g)[2]	8.9	5.8-12.9	10	6-13.6	0.812
MSF (g)[2]	11.2	8.5-16.5	12.1	8.9-18.7	0.638
Sodium (g)[2]	2.8	2.1-3.6	2.8	2.2-4.1	0.545
Cholesterol (mg)[2]	180.6	132.5-296.8	196.6	136.7-269.3	0.879

[1]Means and standard deviations, with statistical analysis by Student's t-test and $p < 0.05$ as significance level; [2]Medians and interquartiles ranges, with statistical analysis by Mann-Whitney test and $p < 0.05$ as significance level; [3]SD = standard deviation; [4]IQR = interquartile range.

Thus, the possible method limitations were controlled in this study, ensuring reliability of the results.

The use of endoscopy service was significantly higher for women (72.1%), confirming studies showing that women seek more health services[27,28].

Still concerning the sex, Nogara, Frandoloso and Rezende[23] did not found significant difference between patients with *H. pylori* (PR = 2.4; 95% CI = 0.79 - 7.19; p = 0.165). According McCallion *et al*.[29] and Kodaira, Escobar and Grisi[30], the infection is equally found in men and women, which was confirmed in our study.

Regarding population education, the majority (55.1%) had education levels between 9 and 11 years of study. According to the data from National Household Sample Survey (PNAD), the average number of years of study in Brazil is 7 and 7.3 years for men and women, respectively; whereas in Northeast these numbers fall to 5.6 and 6.4 years[14]. Therefore, our results were a little better when compared with the years of study in the Northeast and Brazil.

Patients were predominantly of race classified as ''others'' (43.6%), which included black, mixed race and yellow, followed by brunette color (42.2%). This scenario is partly according to the National Household Survey data on the Northeast, showing the distribution to 28.9% white, 10.5% black, 59.8% of mixed race and 0.8% yellow[14].

Epidemiological review of *H. pylori* infection found a lower prevalence of the microorganism in Caucasians individuals[30]. The mechanism responsible for this difference cannot be attributed only to the socioeconomic conditions or way of life. Graham and colleagues[31] reported a difference in prevalence by race, even after adjusting by socioeconomic factors. Thereby, it can be presumed that genetic factors that determine a different susceptibility to the ethnic groups may have relevance.

Finally, analyzing the distribution by sex, age, years of study, household income and race, the groups did not differ, showing homogeneity that facilitates the interpretation of the findings relative to the nutritional status and food intake.

As regards nutritional status, we observed that most patients both Hp - (60.3%) and Hp + (67.8%) had excess weight, with no difference between groups, either by evaluation of BMI categories (Tables II and III) as by assessing of means from this. The values found were above of data presented in the last national survey conducted by the Brazilian Institute of Geography and Statistics (IBGE) through the Consumer Expenditure Survey (POF) 2008-2009[32], which showed 49% of overweight in the Brazilian population over 20 years of age. According to the similar demographic profile of the two groups, also there was no difference considering sex. However, regardless with or without infection, the findings place the participants of both groups with higher percentages of weight excess than those found in the Northeast, considering sex (Table III), since POF data 2008-2009[32] showed a percentage of weight excess of 47.7% among men and 46.7% among women, so that only the male individuals Hp - in this study had similar proportion to those data.

Ioannou *et al*.[33] in a population-based study that included 6,724 adult participants of Third National Health and Nutrition Examination Survey (NHANES III) showed that the presence of *H. pylori*/CagA was not associated with obesity or overweight.

Contrary, in a study of Wu *et al*.[3] with 414 patients with morbid obesity and 683 controls, the prevalence of *H. pylori* infection was shown to be significantly higher in thin patients than in obese, and the authors concluded that the absence of *H. pylori* may be a factor risk for developing obesity. Data from this epidemiologic study are not strong argument for this hypothesis because there were not correlated with hygiene standards and socio-economics, and these, as previously mentioned, are also known to show a relationship with nutritional status and obesity[34,35].

On the other hand, modest increases of weight and BMI have been reported after eradication of *H. pylori*. In a Japanese study, there was a small (< 0.5 kg/m^2), but significant BMI increase after 1 year of successful eradication of *H. pylori* (n = 421), but there was no change in BMI after treatment failure (n = 158)[36]. In another study from Japan, 37 patients successfully treated for the bacteria were followed for three years and had a BMI increase, compared to the situation before the treatment, although it was not investigated whether this increase was significantly greater than that experienced the placebo group[37]. After these two studies, it was carried out a study in Europe also to investigate the impact of eradication of *H. pylori* in BMI and it was found that the mean BMI increased from 27.5 kg/m^2 to 27.8 kg/m^2 after 6 months in the intervention group compared to an increase of 27.0 kg/m^2 for 27.2 kg/m^2 in the placebo group and the adjusted difference between the groups was statistically significant[38].

François *et al*.[4] found that after eradication of *H. pylori*, the levels of postprandial ghrelin were almost six times higher than the pre-eradication (p = 0.005) and the median of leptin levels also increased (20%) significantly (p <0.001). The BMI increased significantly (5 ± 2%, p = 0.008) along 18 months in *H. pylori*-positive subjects initially, but was not significantly altered in individuals which were *H. pylori*-negative at baseline. The change of ghrelin before the meal after the eradication of *H. pylori* was positively correlated with change in BMI after eradication of *H. pylori*. These data provide direct evidence that colonization by *H. pylori* is involved in the leptin and ghrelin regulation, with consequent effects on body's morphometry.

It is noticed that the studies discussed here had differentiated samples, some being population-based like others that included few subjects. There may be other factors involved, besides the sample size, how the population characteristics of different regions. There may also be an impact of biochemical markers such, as

leptin and ghrelin mentioned here and even these may be influenced differently according to the population profile studied. There are still many questions to be answered and more studies are needed, especially coming from different regions, helping to create a more detailed and thorough framework of existing interrelationships.

Our study showed, additionally, that the presence of *H. pylori* did not affect food intake, relative to diet chemical composition, and besides there was no association considering the sex of the patients.

How the intention was only check potential influences on body weight, the focus has been linked to the quantitative analysis of diet, has not being investigated, in a comparative way, the foods present in the daily menus. The lack of relationship between BMI and the presence of infection is consistent with the lack of relationship between this and the food intake. On the other hand, worth thinking about the fact that other studies conducted in the region in the last 10 years, comparing the food intake of carriers and non-carriers of different conditions, showed certain homogeneity in Ceará menu, making it difficult to find some significant statistic on differences detected[39-40].

Our study has some limitations. Firstly, biochemical markers levels of appetite and satiety were not investigated. However, both groups were very homogeneous in terms to social-economic-demographic profile, nutritional and food. The assessment of nutritional status and food intake was consistent among themselves by showing do not have participation of *H. pylori* infection in the occurrence of these events. Secondly, the symptoms were not identified, because as patients were treated at an Endoscopy Service, symptoms such as dyspepsia and indigestion could have influenced food intake.

Remains the proposal to continuation of the investigation, checking the effects of infection eradication, verifying dosages of biochemical markers of appetite and evaluating others food components.

Conclusion

The prevalence of excess weight was high in the studied group, with no difference considering the *H. pylori* infection. Besides, the food intake of the assessed groups was also similar in all components analyzed: calorie, fibers, carbohydrates, proteins, total fats, saturated fats, polyunsaturated fats, monounsaturated fats, sodium and cholesterol. Therefore, the nutritional status and the food intake were similar in both groups and were not associated with H. pylori infection.

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Conflict of interest

None.

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